

REMARKS

STATUS OF CLAIMS

Claims 1-18 and 28 are now pending in this application. Claims 19-27 have been withdrawn from consideration as being directed to a non-elected invention.

The indication that claims 9-11 are allowable and that claim 28 is objected to, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims is acknowledged and appreciated.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 103

Claims 1-8 and 12-18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Takahara (U.S. Patent No. 6,628,355).

The rejections are respectfully traversed.

Claim 1 recites steps required to form a plurality of microlenses on one of a pair of principal faces of a display panel and includes, *inter alia*:

- ...
- (b) a step of forming a photocurable material layer on one of a pair of outer principal faces, being opposite to each other, of the display panel;
- (c) a step of exposing the photocurable material layer to light via the display panel, wherein the photocurable material layer is partially cured with light which has been transmitted through at least the first picture element; and
- (d) a step of removing an uncured portion of the photocurable material layer having been exposed to light, thereby forming a plurality of microlenses.

With regard to step (b), the Examiner refers to a step of forming photocurable material 691, Figs. 69 and 95, and column 130, lines 34-65 of Takahara. However, material 691 is an

optical coupling agent such as water and is not used in “forming” microlens 641. In addition, column 130, lines 34-65 describe:

In FIG. 95, although the color filter 151 is arranged on the exit side of the microlens 641, it may [sic] arranged on the incident side. In other words, light emitted from the color filter 151 is transmitted through the microlens 641 and incident on the liquid crystal display panel. The microlens 641 may be of a semicylindrical type. A colored microlens 641 and the color filter 151 may be formed integrally with each other.

In the specification of the present invention, in consideration of a display panel having no pixel electrode, a pixel electrode itself has been described, for example, as a pixel electrode 14, and a pixel in a wide sense, including a type having no pixel electrode, has been described, for example, as a pixel 14.

As evident in the aforementioned description, the present invention has the advantage that display contrast can be even further enhanced in comparison with prior art.

In the display panel of the present invention, since the color filter is formed after the phase separation of the liquid crystal layer, the phase separation of the PD liquid crystal layer can be performed under an optimum condition, and satisfactory display contrast can be realized. Since the color filter is formed under the pixel electrode 14, ultraviolet rays can be irradiated through the counter electrode 25 and therefore the PD liquid crystal layer can be phase-separated satisfactorily.

Since space is formed between the pixel electrodes 14, electromagnetic coupling can be prevented between the signal line 15 and the pixel electrode 14 and there is no occurrence of light escape from the peripheral portion of the pixel electrode. As a result, satisfactory display contrast can be realized.

Clearly, there is no description of forming a photocurable material layer that will be processed *to form* microlens 641, as required by step (a).

With regard to step (c), the Examiner refers again to column 130, lines 34-65, as well as column 72, lines 35-48 and column 129, line 50+ of Takahara.

Step (c) of independent claim 1 requires light to be transmitted through the picture element and the light that exists the picture element is used to partially cure the photocurable

material layer. Referring to the above-quoted portion of column 130, lines 34-65, it is clear that there is no mention of exposing the photocurable material layer that has been formed to light via the display panel, wherein the photocurable material layer is partially cured *with light which has been transmitted through at least the first picture element*, as required by step (c).

Column 72, lines 35-48 describes:

In FIG. 95, although the microlens 641 is formed on another substrate 642, it may be formed directly on the glass substrate of a display panel 22 as shown in FIG. 102. A microlens 641a colored red is formed at a position corresponding to a pixel electrode 14a. Likewise, a microlens 641b colored green is formed at a position corresponding to a pixel electrode 14b, and a microlens 641c colored blue is formed at a position corresponding to a pixel electrode 14c.

The microlens 641 is formed by containing colors in ultraviolet ray setting resin. A red (R) microlens is first formed with the stamper, and then a green (G) microlens is formed with the stamper. Finally, a blue (B) microlens is formed. If the three processes are performed in this manner, a display panel with R, G, and B microlenses can be fabricated as shown in FIG. 102.

This portion also has no description regarding exposing the photocurable material layer that has been formed to light via the display panel, wherein the photocurable material layer is partially cured *with light which has been transmitted through at least the first picture element*, as required by step (c).

Column 129, line 50 to column 130, line 33 of Takahara describes:

The microlens substrate 642 (e.g., FIG. 95) may be arranged on the exit side of the display panel.

In the Fresnel lenses 641c and 641 and prism sheet 1061 shown in FIGS. 105 and 106, a single Fresnel lens 641c or 641 may be arranged for a plurality of pixels. To improve a visual field angle, a single Fresnel lens 641c or 641 may be arranged over the entire display area of the display panel 22. If the direction of incident light onto the display panel is suitably aligned with the position of the eyes of an observer, an image on the display panel 22 can be satisfactorily

observed. Although the microlens substrate 642 and Fresnel lenses 641c and 641 differ in shape, they have the same function.

In the Fresnel lenses 641c and 641 and prism sheet 1061 shown in FIGS. 106 and 108, it is preferable that the flat side be directed to the display panel. The reflectance of incident light onto the aforementioned lenses is reduced, and irregular reflection of light is suppressed. As a result, high-quality display can be realized. Also, it is preferable that the surface of the aforementioned substrate 642, microlens, or prism should be formed with an antireflection film.

As an example, the antireflection film is constituted by a low refractive index layer, the layer being stacked with fluorine-contained polymer particles whose average particle diameter is in a range of 5 to 200 nm and also being formed with microvoids between particles. Also, there is a photosetting resin whose refractive index is 1.35 to 1.45. In addition, the antireflection film may be formed from a dielectric multilayer film.

While it has been described that the PD liquid crystal is mainly employed as the liquid crystal layer 21 of the transmission display panel or reflection display panel of the present invention, the invention is not limited to this. It may be an STN liquid crystal, a TN liquid crystal, a guest-host liquid crystal, a ferroelectric liquid crystal, a homeotropic liquid crystal, a liquid crystal which has comb electrode constitution and performs light modulation by varying the angle of orientation of a liquid crystal molecule in a horizontal direction (fabricated by Hitachi), and a plasma address liquid crystal (fabricated by Sony). Also, depending on the constitution of a display panel, the PD liquid crystal is applicable to an organic EL display panel, an inorganic EL display panel, a plasma display panel, and an LED display panel. The same may be said of the projection type display, the view finder, the direct vision display, the fabrication method, the drive method, and the drive unit.

The Fresnel lens (or a microlens) 641 may be a concave lens or a convex lens. The lens is set so that it is suitable to the position at which an observer sees. Also, the Fresnel lens 641 of FIG. 106 may be a reflection type Fresnel lens. The reflection type Fresnel lens is formed by processing a metal plate.

The only mention of how microlens 641 is formed in this portion is the description, "The reflection type Fresnel lens is formed by processing a metal plate." However, there is no description of what is involved in "processing a metal plate". Thus, this portion, like all the other referenced portions, has no description regarding exposing the photocurable material layer that has been formed to light via the display panel, wherein the photocurable material layer is

partially cured *with light which has been transmitted through at least the first picture element*, as required by step (c).

With respect to step (d), the Examiner refers to FIGS. 95-96 and paragraphs 347-349. However, Takahara has no numbered paragraphs. Furthermore, a review of the descriptions references FIGS. 95-96 reveals that there is no description regarding “removing an uncured portion of the photocurable material layer having been exposed to light, thereby forming a plurality of microlenses”, as required by step (d).

In view of the above, independent claim 1 is patentable over Takahara, as are claims 2-8 and 12-18. Therefore, the allowance of claims 1-8 and 12-18 is respectfully solicited.

CONCLUSION

In view of the above, Applicants believe the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Edward J. Wise (Reg. No. 34,523) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§ 1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

By 

Charles Gorenstein

Registration No.: 29,271

BIRCH, STEWART, KOLASCH & BIRCH, LLP

8110 Gatehouse Road

Suite 100 East

P.O. Box 747

Falls Church, Virginia 22040-0747

(703) 205-8000

Attorney for Applicant